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(19) FEDERAL REPUBLIC OF GERMANY (12) **Published Patent Application**

(51) Int.Cl.[6]: A 47 B 88/04

(10) **DE 44 32 821 A 1**

(21) File reference: P 44 32 821.4
(22) Date of application: 15. 9.94
(43) Date of publication: 21. 3.96

GERMAN PATENT OFFICE

DE 44 32 821 A 1

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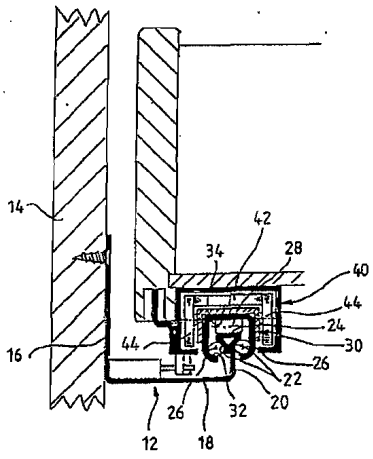
(56) Publications to be taken into consideration when evaluating the patentability
DE 43 37 485 A1
DE 36 23 743 A1
WO 92 13 473

(54) Pull-out guide rail

(57) Pull-out guide rail system for drawers and similar pull-out furniture parts with one guide-rail (12) to be fastened to a furniture wall (14) and one sliding rail (30) under insertion of caged rolling elements (26; 28) unstably positioned along the guide rail and connected with the pull-out furniture part. This sliding rail is designed on one side with a slot along the pull-out direction as a hollow section rail with tracks for the rolling elements set horizontally to the pull-out direction in a staggered manner. The guide rail (12) is equipped at the end which intrudes through the slot into the interior of the sliding rail (30), with tracks of the sliding rail, suitably positioned opposite.

On the sliding rail (30) an outside profile rail (40) is positioned, a hollow section with a rectangular diameter which surrounds the sliding rail, at least for a part of its length in a telescopic manner and which is also slotted at the bottom end in the pull-out direction. By rollers (42; 44) positioned in the gap between the sliding rail (30) and the surrounding profile rail (40), the profile rail is positioned in a longitudinally slideable manner relative to the sliding rail.



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Description

This invention concerns a pull-out guide rail for drawers and similar pull-out furniture parts with one guide-rail to be fastened to a furniture wall and one sliding rail under insertion of rolling elements kept in a cage, unstably positioned along the guide rail and connected with the pull-out furniture part. This sliding rail is designed on one side with a slot along the pull-out direction as a hollow section rail with tracks for the rolling elements set horizontally to the pull-out direction in a staggered manner. The guide rail is equipped at the end which intrudes through the slot into the interior of the sliding rail, with tracks of the sliding rail, suitably positioned opposite.

Such guide rails mounted on rolling elements (DE-OS 31 27 701; DE-OS 36 23 743) are used besides the also very popular so-called roller-pull-out rails in an increasing number, especially when smooth running as well as high bearing strength is required. This comparatively higher bearing strength is achieved by a transmission via a number of rolling elements of the weight bearing on the pull-out furniture part instead of transmission via the volume of only two rollers positioned pivoting along the longitudinal rail on one side and on the guide-rail on the other side, on each side of a roller-pull out guide rail pair. These hereby discussed rolling element mounted pull-out guide systems have significantly higher dimensions as opposed to roller-pull-out guide rails. Therefore the sliding rail of the rolling element mounted pull-out guide systems is normally positioned within the drawer side wall which protrudes downwards on the bottom part, whereas the much narrower roller guide rails may be positioned between the outer drawer walls and the facing inner walls of the cupboard corpus, without narrowing the drawers too much.

In both types of guide rail systems, simple pull-outs do not permit the pulling out of a drawer all the way until the rear side of the drawer is flush with the front wall of the cupboard corpus or even a bit further. That means the rear part of the drawer is not freely accessible. This pull-out loss, caused in roller pull-out systems in the fully pulled out position by the rollers being positioned closely arresting next to each other and in rolling element pull-outs caused by the cage holding the rolling element mounting, is avoided in so-called full pull-out systems, by inserting a third profile rail into the guide path. For roller full pull-out systems necessarily the building height increases, which is however not a problem normally because of the proposed positioning between the side wall of the drawer and the furniture corpus side wall.

If we now try and realize the full pull-out in rolling element mounted guide rail systems by adding a third profile rail, the obvious solution is to position two hollow profile rails below the drawer bottom. In doing so, however, the disadvantage occurs in that the building height of the two profile rail pairs increases so much that with the usual drawers one of the profile rails will be standing below the drawer's side wall, which is optically disturbing when the drawer is pulled out, and which also restricts the factual additional pull-out distance, because the profile rail protruding downwards may be pulled out only until the inner pane of the drawer's front panel of the next drawer below in its closed position.

The invention is based on the task of further developing pull-out guide rail systems by adding a third profile rail, so that a full pull-out may be achieved, without unduly increasing building height compared to the simple pull-out.

Starting with a pull-out guide rail system of the type mentioned initially, this task is solved according to this invention by positioning on the sliding rail an outside profile rail, namely, a hollow section with a rectangular diameter which surrounds the sliding rail, at least for a part of its length in a telescopic manner and which is also slotted at the bottom end in the pull-out direction. By rollers positioned in the gap between the sliding rail and the surrounding profile rail, the profile rail is positioned in a longitudinally slideable manner relative to the sliding rail.

The additional profile rail is thus not positioned below the sliding rail in between the sliding rail and guide rail, but it surrounds the previous sliding rail on the outside in a telescopic manner whereby significant building height is saved, because the rollers positioned in the gap between sliding rail and the outer profile rail may be designed relatively small.

Preferably the rollers are mounted on one of the rails, which are moveable in a longitudinal manner relative to each other, around a fixed axis, in a pivotable manner, whereby the pivoting axes of the rollers are partly horizontally and partly vertically aligned, in order to guarantee, on the one hand, the horizontal guiding of the drawer and, on the other, to transmit the weight of the drawer and its content.

The pivoting axes of the rollers are preferably designed as bearing pins, which jut out from the outside of the sliding rail in the direction of the opposite inside of the profile rail. Thus the design may be laid out in such a manner that the bearing pins are fixed directly on the sliding rail whereby, for example, one end of the bearing pin is riveted in a drilling in the opposite wall of the sliding rail, or that the bearing pins are fixed to at least one profile held separately on the sliding rail.

The embodiment may to its advantage be done in such a way, that at least two rollers distanced from each other lengthwise with a vertical pivoting axis in the gap between the closed upper partition area of the sliding rail and the partition area of the outer profile rail and in the gaps between the two blades of the sliding rail and the outer profile rail, at least a pair of rollers, longitudinally distanced and pivoting around a horizontal pivoting axis, are designed. On each side of the drawer the horizontal guide of the drawer is guaranteed by a minimum of two rollers distanced from each other, while the weight is transmitted via a minimum of two pairs, i.e. altogether a minimum of two rollers on each side of the drawer.

An especially simple embodiment is thereby achieved if two rollers are designed protruding centrally, positioned from the upper partition area of the sliding rail and mounted pivoting around a longitudinal axis, the diameter of which is mainly equal to the clear distance, measured in horizontal direction, between the inner areas formed by the lateral blades of the outer profile rail, and when two distanced rollers are designed, in the spaces between the lateral blades of the sliding rails and the outer profile rails, mounted pivoting around a horizontal axis, the diameter of which mainly equals the clear inner height of the outer profile rail, measured in vertical direction between the inside of the partition area and the insides of the lower area, from the blades to the gap pitched wall strips.

An even lower lateral running play between the sliding rail and the additional profile rail may be achieved if more than two rollers are provided which are distanced from each other in the pull-out direction, and pivoting around a vertical axle, the diameter of which is smaller than the clear inner distance between the inner areas of the outer profile rail constituted by the lateral blades, whereby the pivotal axis of rollers staggered to each other in running direction are each staggered by such a measure to the longitudinal central axis of the partition area towards the outside, that the circumferential areas of the rollers partly touch one and partly touch the other inside of the inner areas between the blades of the outer profile rail.

By the same principle the vertical play may be decreased by the provision of more than two rollers each in the spaces between the lateral blades of the sliding rail and the outer profile rail. These rollers are distanced from each other and mounted pivoting around a horizontal axis. Their diameter is smaller than the clear inner height of the profile rail, measured in vertical direction between the inner area of the partition area and the inner areas of the lower area, measured from the blades to the gap pitched wall strips, and the pivoting axis of rollers staggered in pull-out direction to each other are staggered in such a measure in a vertical direction up and down so that the circumferential areas of the rollers are touching partly one and partly the other inner area of the upper partition area or the opposite inner area of the pitched lower wall strip.

The special profile for the bearing pins mounting the rollers is advisably shaped from an originally plane metal sheet by means of a die cut-press process into a long u-profile with the profile of a U turned 180°. Thereby the clear inner distance between the U-blades of the profile which holds the bearing pins is selected roughly equal to the to the distance measured over the outer areas of the sliding rail blade areas, whereby the bearing pin profile is placed from the partition area of the sliding rail onto the sliding rail and then fixed to it.

The connection of the profile and the sliding rail may be done by electrical resistance welding or by a rivet, bayonet, or locking connection, whereby, for example, an inclined tongue cut out of the profile is arrested by a dedicated stamped opening in the sliding rail.

Instead of a separate single profile holding all the bearing pins for the rollers, this profile may be separated into a number of groups of part profiles, each pivoting around a vertical or horizontal axis and holding the rollers, whereby these part profiles may be fixed – in order to adapt to different drawer or cupboard dimensions – at different distances on the dedicated profile rail.

The invention has in the following description been shown in several embodiments in connection with drawings, namely, it is shown as follows:

Fig. 1 and 2 show a schematic simplified drawing of a pull-out guide rail system according to this invention in completely pulled out position and completely pushed into the cupboard corpus position.

Fig. 3 is a profile view through a pull-out guide rail system according to this invention in a cut plane running horizontally to the pull-out direction.

Fig. 4 is a perspective view of part sections of a guide rail and a sliding rail in a guide rail system according to this invention; whereby the additional outer profile rail is indicated in a pixeled line.

Fig. 5 is a perspective view of the front end of the sliding rail of the embodiment shown in fig. 4 with the outer profile rail again pixeled in.

Fig. 6 is similar to **Fig.** 5 a perspective view of a changed embodiment of the sliding rail and the pixeled outer profile rail; and

Fig. 7 is functionally similar to **Fig.** 5, a perspective view of the sliding rail of a further changed embodiment.

In Fig. 1 and 2 a pull-out guide rail system according to this invention labeled **10** is shown in its entirety in both end positions, i.e. completely pulled out and completely pushed in, drawn schematically, whereby the vertical line A represents the position of the vertical front of a cupboard corpus which is not otherwise shown in this drawing, in which drawers are supposed to be mounted by way of guide rail systems **10** in such a way that they may be pulled out and pushed in.

The guide rail system **10** shows – as can be seen especially in **Fig.** 3 in the section cut - a guide rail **10** to be fastened inside the cupboard corpus, which has the usual form of a profile rail made of folded sheet metal with a vertical profile blade **16** which is to be screwed onto the inside of the cupboard side wall **14** of the cupboard corpus, a profile blade **18**, folded at right-angles from its lower edge and another profile blade 20 which is folded upwards at right angles from this one, and has at its upper end sliding tracks **22, 24** for rolling elements in the shape of mounting balls **26** and bearing rolls , which roll off on the other side onto sliding tracks **32, 34** in the interior of a sliding rail **30** designed as a hollow profile rail with a mainly inverse U-shaped section profile.

The cage usually made of plastic, and mounting the bearing rolls **28** and mounting balls **26** in their alignment to each other is not shown in **Fig.** 3; however the pull-out guide rail system in its described form is identical to the rolling element mounted simple pull-out guide rail systems. (e.g. DE-PS 26 23 743)

The evolution into a full pull-out system of low building height is realized according to this invention in such a way,

that on the sliding rail **30** a further outer profile rail **40** is provided, which surrounds it telescopically and is a hollow section profile slit in pull-out direction on the bottom side with a rectangular cross section; this profile rail is mounted on rollers **42, 44** longitudinally moveable onto the sliding rail **30.**

The rollers **42** are mounted around axes running vertically to the partition area of the profile rail **30** and the rollers **44** are mounted pivoting on the sliding rail at right-angled axes protruding from the lateral blades of the sliding rail, whereby the mounting is done on bearing pins **46**, which are either fastened in the manner shown in Fig. 7 directly on the partition area or on the blade areas of the sliding rails, or which are mounted in the way shown in **Fig. 4-6** by special part profiles **48a; 48b** shaped from sheet metal in a cross-sectional U-shape. The part profiles are set on the sliding rail **30** at some distance from each other and then fixed permanently to the sliding rail, which may be done by electric resistance welding or other known connecting processes.

The crucial element is that each part profile **48a; 48b** has at least one roller **42**, pivoting on a bearing pin centered protruding vertically from the partition area of the part profile and one each roller **44** mounted on bearing pins protruding horizontally one each of the two blades of the sliding rail 30. Instead of the part profiles 48a; 48b the rollers may also be mounted on a one-piece elongated profile 48; however the arrangement on part profiles is preferred, in order to be able to fix the part profiles **48a; 48b**, equipped with rollers **42; 44**, in selectable distances onto the sliding rail **30**, and thus enable adaptation to guide rail systems of different lengths.

It is clear that in the embodiments shown in **Fig 4**, 5 and 7 the rollers **42** must have a diameter equivalent to the clear width between the inside areas of the blades of the outer profile rail **40**, while the rollers pivoting around horizontal axes have a diameter which is equivalent to the height between the inner areas of the partition and the inside areas of the lower wall strips protruding from the lateral blades of the outer profile rail **40.**

In **Fig.** 6 a different embodiment is shown, where each part profile **48a; 48b** bears two rollers **42a; 42b** pivoting around a vertical axis; the diameter of these rollers is smaller than the diameter of the rollers **42**, and their pivoting axes are staggered in opposite directions so far outward, that the rollers touch the opposite inside areas of the blades of the outer profile **40.** It is obvious that this change is also possible for the rollers **44** pivoting around a horizontal axis, e.g. that instead of the described rollers **44** of large diameter, bearing rollers of smaller diameter with a staggered position of the pivoting axis may be provided, where then on each side of sliding rail **30,** at least one further roller each must be provided, staggered in the opposite direction, in order to guide the outer profile rail **40** on the sliding rail **30** in the height direction without play.

Patent Claims

1. Pull-out guide rail system for drawers and similar pull-out furniture parts with one guide-rail to be fastened to a furniture wall and one sliding rail under insertion of rolling elements mounted in a cage, unstably positioned along the guide rail and connected with the pull-out furniture part. This sliding rail is designed on one side with a slot along the pull-out direction as a hollow section rail with tracks for the rolling elements set horizontally to the pull-out direction in a staggered manner. The guide rail is equipped at the end, which intrudes through the slot into the interior of the sliding rail, with tracks of the sliding rail, suitably positioned opposite, so **characterized** that on the sliding rail **(30)** is arranged one outer profile rail **(40)**, designed as a hollow section profile with a rectangular cross section, which telescopically surrounds the rail at least for part of its length and is on the bottom side slotted in the pull-out direction. This outer profile rail is mounted in a longitudinally unstable manner relative to the profile rail **(30)** on rollers **(42; 44)** arranged in the space between the sliding rail **(30)** and the surrounding profile rail **(40).**

2. Pull-out guide system according to Claim 1, so characterized, that the rollers **(44; 42)** are mounted pivoting around a fixed axis each on one of the longitudinally moveable rails relative to each other and that the pivoting axes of both the roller **(42; 44)** are partly horizontal and partly vertically aligned.

3. Pull-out guide system according to Claim 2, so characterized, that the pivoting axes of the rollers **(42; 44)** are formed by bearing pins **(46)** which protrude from the outer areas of the sliding rail **(30)** in the direction of the dedicated inner area of the outer profile rail **(40).**

4. Pull-out guide system according to Claim 3, so characterized, that the bearing pins **(46)** are directly fixed to the sliding rail **(30)** (Fig. 7)

5. Pull-out guide system according to Claim 3, so characterized, that the bearing pins **(46)** are fixed to at least one profile **(48a; 48b)** specially fixed on the sliding rail **(30).**

6. Pull-out guide system according to Claims 2-5, so characterized that a minimum of two rollers **(42)**, distanced lengthwise from each other and having a vertical pivoting axis are provided in the space between the closed upper partition area of the sliding rail **(30)** and the partition area of the outer profile rail **(40)** and in the spaces between the two blades of the sliding rail **(30)** and the outer profile rail **(40).** The rollers are at least a minimum of one pair and they are distanced in a longitudinal direction and pivoting around a horizontal axis.

7. Pull-out guide system according to Claim 6, so characterized that two rollers **(42)** each are provided, protruding centrally from the upper partition area of the sliding rail and mounted pivoting around a vertical axis. These rollers have a diameter equal to the clear inner distance, measured in a horizontal direction, between the inner areas formed by the lateral blades of the outer profile rail **(40).**

8. Pull-out guide system according to Claim 6 or 7, so characterized that in the spaces between the lateral blades of the sliding rail **(30)** and the outer profile rail **(40)** 2 rollers **(44)** are each provided; they are distanced from each other and mounted pivoting around a horizontal axis, and their diameter equals mainly the clear inner height of the outer profile rail **(40)** measured vertically between the inside area of the partition area and the inside areas of the lower wall strips pitched from the blades to the slot.

9. Pull-out guide system according to Claim 6, so characterized that more than two rollers **(42a, 42b)** distanced in the pull-out direction and pivoting around a vertical axis are provided, whose diameter is smaller than the clear inner distance between the inner areas formed by the lateral blades of the outer profile rail **(40)**, and that the axes of the rollers **(42a, 42b)** staggered in relation to each other in pull-out direction have been staggered by such a measure to the longitudinal centre axis of the partition area, that the circumferential areas of the rollers **(42a, 42b)** touch partly one inside and partly another inside of the insides formed between the lateral blades of the outer profile rail **(40)**.

10. Pull-out guide system according to Claim 6 or 9, so characterized, that in the spaces between the lateral blades of the sliding rail **(30)** and the outer profile rail **(40)**, more than two rollers **(44)** distanced from each other and mounted pivoting around a horizontal axis are provided, whose diameter is smaller than the clear inner distance measured vertically between the inner areas of the partition area and the inner areas of the lower wall strips which are jutting from the blades to the slot, and that the pivoting axes of rollers **(44)** staggered in pull-out direction are staggered in such a measure in vertical direction up and down, that the circumferential areas of the rollers **(44)** are touching partly one inside and partly another inside of the upper partition area or the dedicated inside of the pitching lower wall strips.

11. Pull-out guide system according to Claim 5, so characterized that the special profile **(48a; 48b)** mounting the bearing pins **(46)** for the rollers is molded from an originally plane metal sheet in the stamping-press process into a long U-profile with the section profile of a U turned 180°.

12. Pull-out guide system according to Claim 11, so characterized that the clear inner distance between the U-blades of the profile **(48a; 48b)** mounting the bearing pins, is roughly equal to the distance measured over the outer areas of the blades of the sliding rail (30), and that the profile **(48a; 48b)** equipped with the bearing pins **(46)** is mounted onto the sliding rail from the partition area of the sliding rail, and then permanently fixed to it.

13. Pull-out guide system according to Claim 12, so characterized, that the profile **(48a; 48b)** provided with bearing pins **(46)** for the rollers **(42; 44)** is connected to the sliding rail by electrical resistance welding.

14. Pull-out guide system according to Claim 12, so characterized, that the profile **(48a; 48b)** mounting the bearing pins (46) for the rollers **(42; 44)** is connected to the sliding rail by a rivet, bayonet, or locking connection.

15. Pull-out guide system according to one of the Claims 11-14, so characterized, that the profile mounting the bearing pins **(46)** is separated into at least two groups of part profiles **(48a and 48b** respectively) of pivoting mounted rollers **(42; 44)** pivoting around a vertical or horizontal axis, these part profiles are mountable on the dedicated profile rail **(30)** at selectable distances.

Attachment: 3 pages of drawings

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	Date of publication	21 Mar 1996

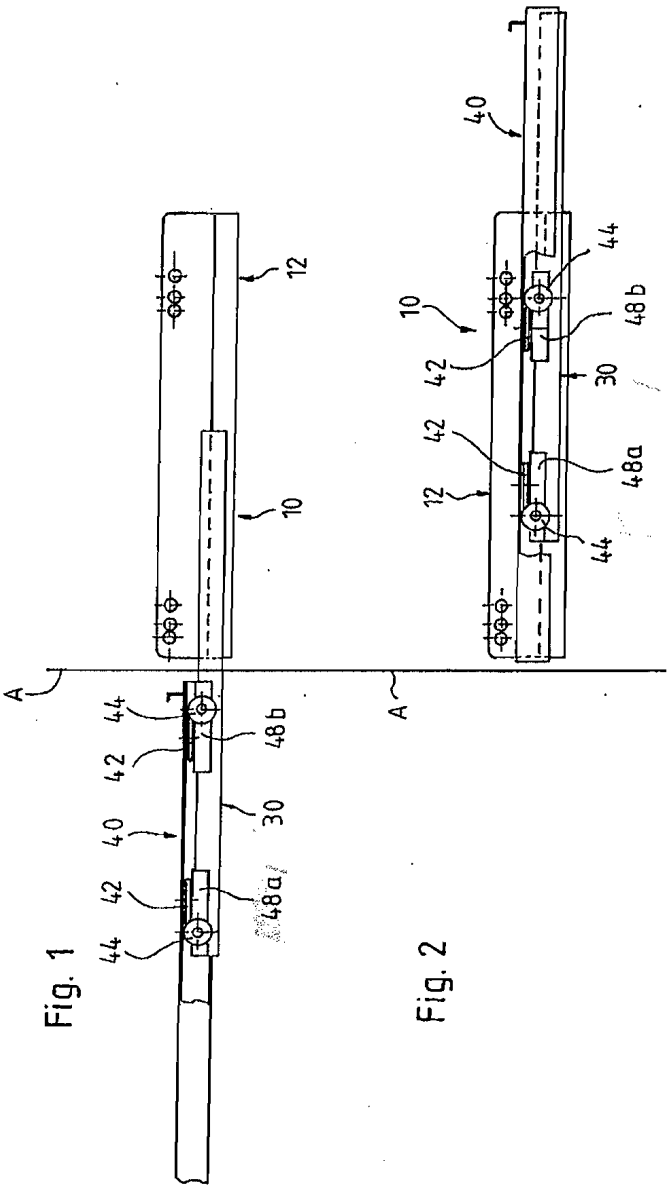

Fig. 1

Fig. 2

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	Date of publication	21 Mar 1996

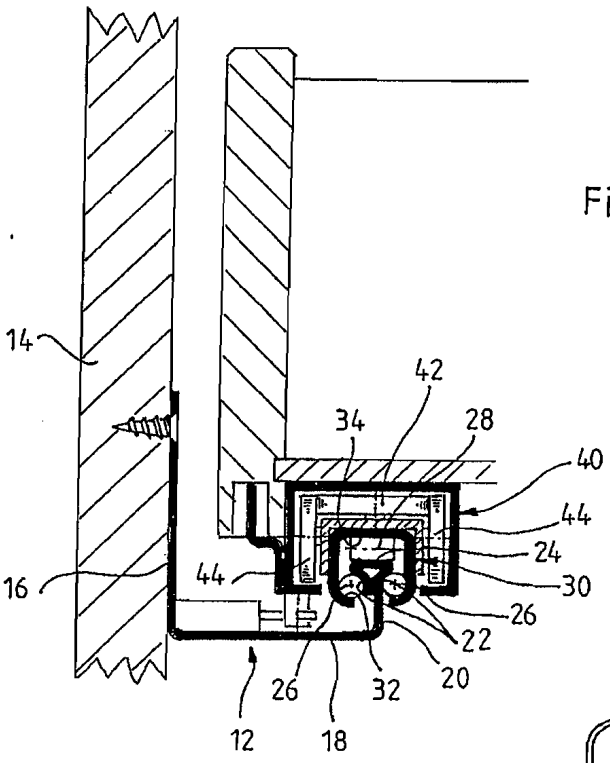

Fig. 3

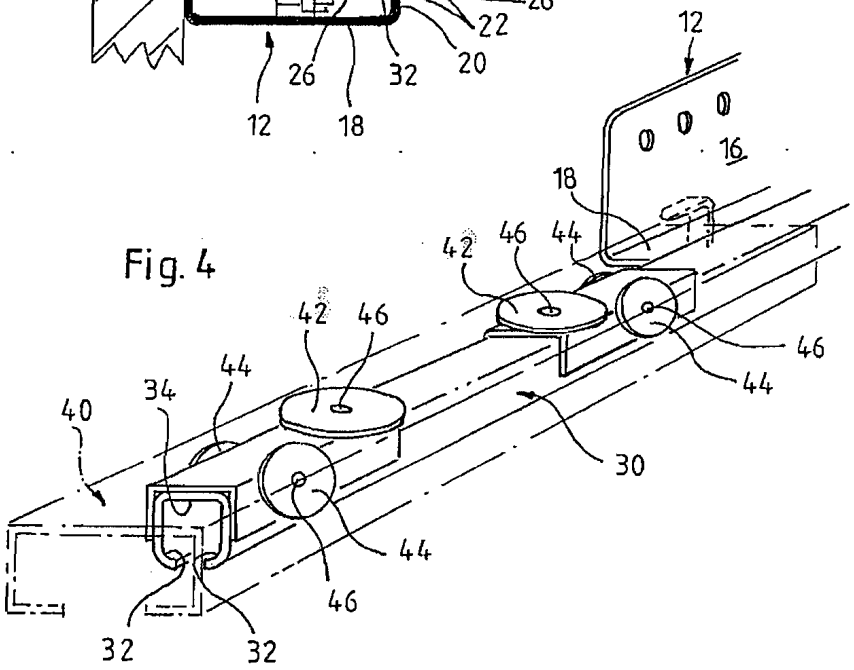

Fig. 4

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Fig. 5

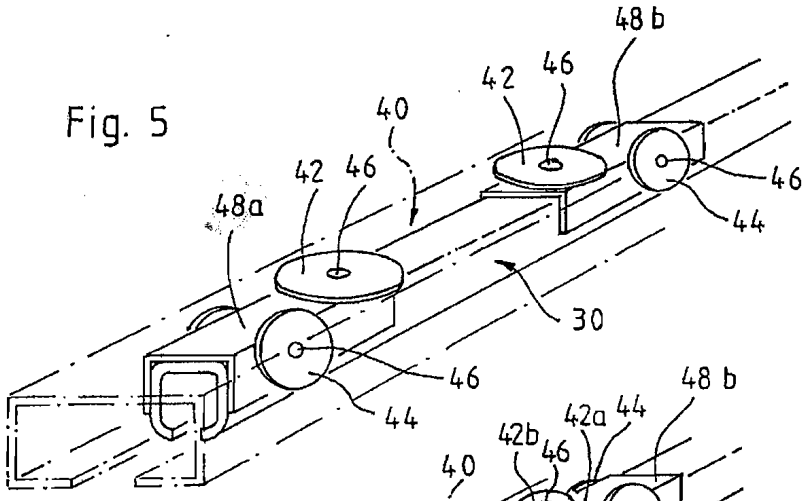

Fig.6

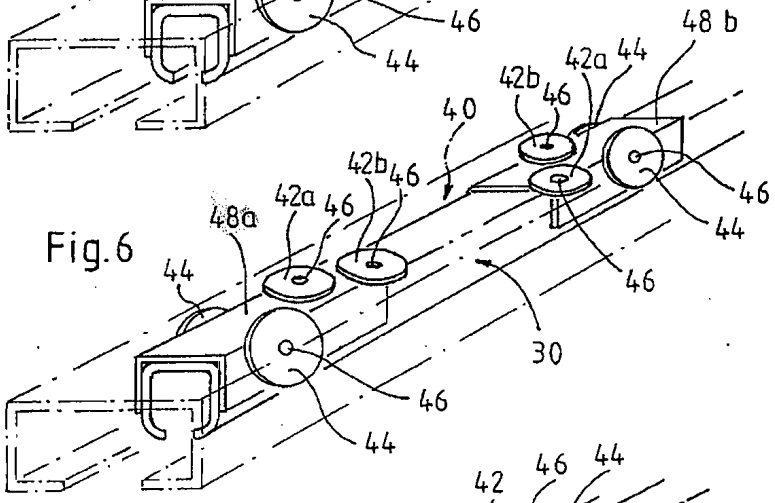

Fig. 7